CLAIMS

What is claimed is:

1.   A method for indexing minimum coded units (MCUs) in a Joint Photographic Expert
Group (JPEG) bit stream, comprising:

> entropy decoding a first minimum code unit (MCU) to determine a first bit offset
> of a second MCU from a start of the bit stream, wherein the first MCU
> immediately precedes the second MCU in the bit stream; and
>
> indexing the second MCU by storing the first bit offset in an index.

2.   The method of claim 1, wherein:

> said entropy decoding a first MCU further comprises determining a first DC
> coefficient of the first MCU;
>
> said indexing the second MCU further comprises saving the first DC coefficient
> in the index;

3.   The method of claim 2, further comprising:

> receiving a request for the second MCU;
>
> reading the index to determine the first bit offset and the first DC coefficient; and
>
> entropy decoding the second MCU starting at the first bit offset in the bit stream,
> wherein said entropy decoding comprises:
>
> > determining a second bit offset of a third MCU; and
> >
> > determining a second DC coefficient using the first DC coefficient.

4.   The method of claim 3, wherein the second MCU immediately precedes the third MCU
in the bit stream, the method further comprising:

indexing the third MCU by storing the second bit offset and the second DC coefficient in the index.

5.   The method of claim 2, further comprising:

entropy decoding the second MCU to determine (1) a second bit offset of a third MCU from a start of the bit stream and (2) a second DC coefficient of the second MCU, wherein the second MCU immediately precedes the third MCU in the bit stream; and

indexing the third MCU by storing the second bit offset and the second DC coefficient in an index.

6.   A method for indexing minimum coded units (MCUs) in a Joint Photographic Expert Group (JPEG) bit stream, comprising:

receiving a request for an ith MCU in the bit stream;

determining if the ith MCU precedes a last indexed MCU in the bit stream, wherein the last indexed MCU is a last MCU in the bit stream that has its bit offset from a start of the bit stream stored in an index; and

if the ith MCU does not precede the last indexed MCU in the bit stream:

entropy decoding a plurality of the MCUs up to and including the ith MCU in the bit stream to determine their corresponding bit offsets from the start of the bit stream; and

indexing the plurality of the MCUs by saving their corresponding bit offsets in the index.

7.   The method of claim 6, wherein:

said entropy decoding a plurality of the MCUs up to and including the ith MCU in the bit stream further comprises determining a plurality of DC coefficients of the plurality of the MCUs; and

said indexing the plurality of the MCUs further comprises saving the plurality of DC coefficients in the index.

8.   The method of claim 7, further comprising:

reading the index to determine a bit offset of the ith MCU; and

entropy decoding the ith MCU starting at the bit offset in the bit stream.

9.   A method for handling minimum coded units (MCUs) in a Joint Photographic Expert Group (JPEG) bit stream, comprising:

from an index, reading a first bit offset from a start of the bit stream of a current MCU and a first DC coefficient of a preceding MCU in the bit stream.

entropy decoding the current MCU from the first bit offset in the bit stream, wherein said entropy decoding the current MCU includes determining (1) a second bit offset of a subsequent MCU and (2) a second DC coefficient of the current MCU using the first DC coefficient.

10.   The method of claim 9, further comprising:

entropy decoding the subsequent MCU from the second bit offset in the bit stream, wherein said entropy decoding the subsequent MCU includes determining a third DC coefficient of the following MCU using the second DC coefficient.

11.   The method of claim 9, further comprising:

dequantizing the entropy decoded current MCU;

performing an operation on the dequantizied current MCU;

quanitizing the dequantizied current MCU; and

entropy encoding the quantizied current MCU.

12. The method of claim 11, wherein the operation is selected from the group consisting of a linear operation and a pixel replacement operation.

13. A method for transforming an image represented by a Joint Photographic Expert Group (JPEG) bit stream, comprising:

> from an index, reading a plurality of bit offsets from a start of the bit stream for a plurality of minimum coded units (MCUs);

> from the plurality of bit offsets, determining the boundaries of the plurality of MCUs in the bit stream; and

> rearranging an order of the plurality of MCUs in the bit stream.

14. A method for editing a minimum coded unit (MCU) in a Joint Photographic Expert Group (JPEG) bit stream, comprising:

> receiving editing operations for the MCU;

> generating an editing action list comprising the editing operations; and

> performing the editing operations in the editing action list.

15. A method for mapping minimum coded units (MCUs) in a Joint Photographic Expert Group (JPEG) bit stream representing an image, comprising:

> generating a data structure storing MCU block numbers, corresponding MCU block coordinates, and corresponding MCU block editing lists;

> receiving an editing operation to the image; and

> saving the editing operation to a group of the MCU block editing lists of a group of the MCUs affected by the editing operation.

16. The method of claim 15, further comprising:

receiving another editing operation to the image, wherein the editing operation is a cropping of the image;

saving said another editing operation to another group of the MCU block editing lists of another group of the MCUs affected by said another editing operation, wherein said another group of the MCUs consists those MCUs cropped out of the image; and

performing editing operations to the MCU block editing lists excluding said another group of the MCU block editing lists.

17. The method of claim 15, wherein if the editing operation comprises a rotation, the method further comprises calculating new MCU block coordinates for the MCUs.

18. The method of claim 17, further comprising:

determining a new order of the MCUs after the rotation from the new MCU block coordinates; and

entropy encoding the MCUs in the new order.

19. An index of minimum coded units (MCUs) in a Joint Photographic Expert Group (JPEG) bit stream, comprising a plurality of the MCUs and a plurality of bit offsets from a start of the bit stream.

20. The index of claim 19, further comprising a plurality of corresponding DC coefficients.

21. A data structure for minimum coded units (MCUs) in a Joint Photographic Expert Group (JPEG) bit stream, comprising a plurality of MCU block numbers and a plurality of corresponding editing action lists, wherein each editing action list includes editing operations to be performed to the corresponding MCU block.

22. The data structure of claim 21, further comprising a plurality of corresponding MCU block coordinates.